

EGG THAT IS AGITATED WITH EDIBLE COMPOSITION,  
METHOD AND DEVICE FOR MANUFACTURING IT

5       **Technical Field**

The present invention relates to a processed raw egg having an edible composition agitated therein, and a method of, and apparatus for, manufacturing the same. Edible compositions useful to the human body are injected into the inside of a raw egg and agitated inside of the raw egg. The resultant raw egg can be boiled and/or steamed, thereby providing a nourishing meal or a healthy food.

**Background of the Invention**

15       Generally, a raw egg is eaten in a raw state or in a boiled state. At this time, due to the fishy smell inherent to raw egg, generally, people do not eat more than one or two eggs. In case of a boiled egg, the boiled yolk (the yellow of the egg) is not smooth making the egg undesirable for many people to eat.

20       A method of smoking a chicken egg is disclosed in Korean Patent Laid-open Publication Nos. 2001-0003319, 1999-0073457, 2000-0030104, and 2001-0073241.

25       The smoked egg can be kept for a long time and eaten, but it is smoked in such a way that a composition such as salt permeates into the inside of the egg through micro-pores of the egg-shell. Therefore, the fishy smell of the

chicken egg can be alleviated, but not completely removed.  
In addition, since nutrients necessary for the human body  
such as vitamin C, which are hardly present in chicken  
eggs, cannot be permeated adequately into the chicken egg.  
5 The method of smoking eggs merely adjusts the flavor  
thereof, or lengthens its effective date.

In addition, Korean Patent Laid-open Publication No.  
2001-0084617 discloses a method of externally adding  
additives to the contents of a chicken egg. In this method,  
10 the raw chicken egg is dipped in salt water and soaked in  
order for salt to permeate into the egg through micro-pores  
of the egg-shell. Therefore, it merely applies salt for  
seasoning, but does not permeate useful nutrients into the  
egg.

15 On the other hand, Korean Patent Laid-open  
Publication No. 2000-0008062 discloses a method of  
permeating and mixing salt water or spices and condiments  
into the egg.

In the above method, however, a needle from a syringe  
20 is used to inject the additives, so that mass production  
and commercialization is not easy. The method is also not  
hygienic.

Moreover, the albumen and the yolk of the raw egg  
contain a lot of carbohydrate and are highly viscous. The  
25 cohesive power between the albumen and the yolk is  
therefore strong, thereby preventing the injected salt and  
nutrients from spreading over the whole area of the egg.

From the result of experiments, it has been found that the above-processed egg is not easy to eat.

As a result of experiment, i.e., when the raw chicken egg is rotated forwards and in a reverse direction in order  
5 to mix the albumen and the yolk, the following has been discovered.

As a result of rotating a raw chicken egg in a forward direction at a low speed (60rpm/min), intermediate speed, and high speed (500rpm/min), it has been discovered  
10 that the centrifugal force is applied identically to the egg-shell, and the contents of the egg, so that the albumen and the yolk are not mixed.

In addition, it seems that, when the raw chicken egg is rotated in a reverse direction after rotating in a  
15 forward direction, the contents of the egg will be mixed. However, a sliding action occurs only between the egg-shell and the contents thereof, but the yolk inside the albumen is not broken, so that they are not mixed. That is, at the moment when the egg is rotated in the reverse direction,  
20 the solid component, the egg-shell is rotated in the reverse direction instantaneously, but the liquid component, the contents of the egg, responds more slowly.

In consequence, the prior art injects salt or seasonings using a syringe into the egg, but the contents  
25 thereof is not mixed, and is therefore not practical.

In another mixing method, dissimilar to the conventional technique where the raw egg is rotated in a

circumferential direction, the raw egg is spun at a fast speed in the longitudinal direction of the long axis of the egg, thereby mixing the contents of the egg. This is due to the air pocket (air layer) inside the raw egg.

5           In the above technique, when the raw egg is spun until the contents of the egg are thoroughly mixed, the raw egg is rotten or becomes stale to the extent that it cannot be eaten.

10           Furthermore, even when the raw egg does not become too stale to eat, when the egg-shell is removed from a boiled egg by someone expecting that the white of the egg will be exposed, it is likely to spoil his or her appetite. That is, since the mixed albumen and yolk appears to be stained, it has been found from experiments that the outer  
15           appearance makes the egg less appetizing to many people, and reduces their desire to eat the egg.

#### **Summary of the Invention**

20           The present invention has been made in order to solve the above problems, It is an object of the invention to provide a processed raw egg, and a method of, and apparatus for, manufacturing the same, in which various edible compositions are added and mixed in the raw egg including a chicken egg without making it stale. This thereby  
25           eliminates the fishy smell inherent in raw eggs and enables it to be served as a healthy food.

          Another object of the invention is to provide a

processed raw egg, and a method of, and apparatus for, manufacturing the same, in which, when the egg-shell is removed from a well-done egg having an edible composition mixed therewith, the albumen is exposed in the same appearance as in a conventional well-done egg. This thereby eliminates any reluctance on the part of a consumer in eating the egg.

A further object of the invention is to provide a raw egg having various colors, including a natural color of an edible composition added thereto, or a color of edible pigments.

A further object of the invention is to provide a raw egg having various aromas, including an aroma of an edible composition added thereto, or an aroma of various edible spices.

In order to accomplish the above object, according to one aspect of the invention, there is provided a method of manufacturing a processed raw egg having an edible composition agitated therewith. The method comprises: a) a cleaning and sterilizing step for cleaning a raw egg (E) with cleaning water and sterilizing the egg (E); b) an egg-shell drilling step for forming an injection hole (Ef) in the upper portion of the egg-shell (Ea) of the raw egg (E), wherein the raw egg (E) is fixedly erected and a certain pressure is exerted on the upper portion of the long axis of the raw egg by means of a drilling and injection tube (42) such that the injection hole is formed; c) an edible

composition injection step for injecting a predetermined amount of edible composition (P) by penetrating the drilling and injection tube (42) inside the raw egg (E) through the injection hole (Ef) of the raw egg (E); and d) a raw egg agitation step for agitating the edible composition (P) and the viscous albumen (Eb) and yolk (Ed) using an agitating means inserted through the injection hole (Ef) of the raw egg (E).

According to another aspect of the invention, there is provided a method of manufacturing a processed raw egg having an edible composition agitated therewith. The method comprises: a) a cleaning and sterilizing process (a first step) for cleaning a raw egg with cleaning water and sterilizing it with ozone; b) a solidified albumin skin layer forming process (a second step) for forming a solidified albumen skin layer having a thickness of 2-3mm, wherein the albumen inwards of the egg-shell is heated and solidified for 5-8 minutes at 60-65°C; c) an egg-shell drilling process (a third step) for forming an injection hole in the egg-shell, wherein the raw egg is fixedly erected and a pressure of 3-5kg/cm<sup>2</sup> is exerted by means of a drilling and injection tube; d) an edible composition injection process (a fourth step) for injecting an edible composition within 10volume% of the raw egg by penetrating the drilling and injection tube through the injection hole of the raw egg; e) a raw egg agitation process (a fifth step) for agitating the edible composition and the viscous

albumen and yolk in such a manner that a support and axle rod having a rotating member provided in the outer peripheral thereof is inserted through the injection hole and the rotating member is spread and rotated; and f) a  
5 process (a sixth step) for producing a well- done egg by providing heat to the raw egg.

In addition, before the fourth step of injecting the edible composition, or instead of the fourth step, at least part of the yolk is removed by suction, and grains  
10 including rice, barley, brown rice, and glutinous rice are added and agitated. A chicken egg includes 8-11 weight% of egg-shell, 27-32 weight% of yolk, and 56-61 weight% albumen. In the case where the yolk is completely removed, it can provide a healthy food to people who do not like the  
15 yolk, or to whom the yolk, which has a lot of cholesterol, is harmful. Also, since about 30% of the chicken egg can be replaced by grains, nutrients of grains including carbohydrate is added to the raw egg, thereby providing a more balanced, nourishing, meal.

20 Alternatively, at least part of the yolk remains, but part of or the entire of the yolk and/or the albumen can be removed. Instead, fruits can be injected and agitated in a powder form or in a liquid extract form, along with Calcium or an edible material containing Calcium (for example,  
25 dairy product such as milk, bean, green vegetable, seaweed, fish bone), so that a raw egg pudding can be made by means of the inter-mixing of the fruit constituent, Calcium and

the yolk.

According to another aspect of the invention, there is provided an apparatus for manufacturing a processed raw egg having an edible composition agitated therewith. The apparatus comprises: a) a raw egg holding means (30) including a resting groove (31) for a raw egg to be rested thereon and a pressurizer (35) for pressurizing one side of the raw egg (E); b) a drilling and injection tube (42) for forming an injection hole (Ef) in the upper end portion of the raw egg (E); c) a drilling and injection means (40) for injecting an edible composition (P) into the interior of the raw egg, the drilling and injection means including a quantified discharging pump (46) and the drilling and injection tube (42); and d) an agitating means (60) for agitating the internal material of the raw egg, the agitating means being injected in the form of a rod and afterwards spread, and moving upwards and downwards and/or rotating.

The apparatus of the invention may further comprise a suction pump and a suction tube, so that part of or the entirety of the contents of the raw egg including the albumen and the yolk is removed and instead grains or fruits can be added as much as the removed material. In addition, instead of the suction pump, the quantified pump can be reverse-operated to thereby remove part of, or the entirety of, the yolk.

According to another aspect of the invention, there



is provided a processed raw egg having an edible composition agitated therewith. In the processed raw egg, a certain desired amount of edible composition is injected through an injection hole formed in the upper portion of the long axis of a raw egg, and the injected edible composition and the contents of the raw egg are agitated by an agitating means. The agitating means is inserted in the form of a rod, spread in a desired form, and moved inside the raw egg.

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#### **Brief Description of the Drawings**

Further objects and advantages of the invention can be more fully understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

15 FIG. 1 is a flow chart explaining a method of manufacturing a raw egg having an edible composition mixed inside thereof according to the invention; and

20 FIG. 2 illustrates schematically the first step of cleaning and sterilizing a raw egg in the method of the invention;

FIG. 3 illustrates schematically the second step of solidifying the albumen surface of a raw egg in the method of the invention;

25 FIG. 4 shows a cross-section of a raw egg processed by the second step of the invention;

FIG. 5 is a schematic view of an apparatus of the

invention for carrying out the third and fourth steps of the method of the invention;

FIG 6 is a partially enlarged view of the egg-shell drilling and injection means according to the invention;

5        FIGS. 7 to 9 show the operation of the egg-shell drilling and injection means, which carries out the third and fourth steps of the invention;

FIG. 10 is a schematic view of an apparatus of the invention for carrying out the fifth step of the method of  
10        the invention;

FIG. 11 shows a cross-section taken along the line U-U' in FIG. 10;

FIG. 12 is an enlarged view of the agitating means according to the invention;

15        FIG. 13 is an enlarged exploded view of a core portion of the agitating means of the invention;

FIG. 14 is an enlarged view of the portion V in FIG. 12;

FIG. 15 shows a cross-section taken along the line W-W' in FIG. 12;  
20        W' in FIG. 12;

FIG. 16 shows an enlarged cross-section taken along the line X-X' in FIG. 12;

FIG. 17 shows an enlarged cross-section taken along the line Y-Y' in FIG. 12;

25        FIG. 18 shows an enlarged cross-section taken along the line Z-Z' in FIG. 12; and

FIGS. 19 to 21 show the operation of the agitating

means, which carries out the fifth step of the invention;  
and

FIG. 22 is a cross-section of a raw egg processed  
according to the invention.

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### Detailed Description of the Invention

The preferred embodiments of the present invention  
will be hereafter described in detail with reference to the  
accompanying drawings.

10 In this description, the term "raw egg" means an egg-  
cell that a female animal lays in vitro. The raw egg  
includes any egg-cell as long as it has an egg-shell, and a  
yolk and an albumen contained and divided inside the egg-  
shell. Preferably, the raw egg suitable for the invention  
15 includes a bird egg such as a chicken egg, a quail egg, a  
duck egg, and an ostrich egg, an unfertilized or fertilized  
reptile egg such as a turtle egg and an alligator egg.

FIG. 1 is a flow chart showing the procedure of  
manufacturing a raw egg having an edible composition mixed  
20 inside thereof. In the first step in the manufacturing  
method of the invention, an egg having a high freshness is  
selected, cleaned, and sterilized. The first step is  
referred to as a "cleaning and sterilizing step."

FIG. 2 illustrates, schematically the first step of  
25 cleaning and sterilizing a raw egg in the method of the  
invention. Referring to FIG. 2, a plurality of raw eggs (E)  
are arranged on a screen (11) of a cleaning and sterilizing

chamber (10) and cleaned by salt water forcefully sprayed through a nozzle (12).

The cleaning water, i.e., the salt water is harmless to the human body and has a characteristic of suppressing  
5 the multiplication of the Escherichia coli.

The cleaning water passes through the screen (11) on which the raw eggs (E) are placed, and flows downwards to thereby clean other raw eggs placed on the lower screens (11).

10 On completion of the cleaning process, a cold air blower (13) and an ozone generator (14) are operated in order to blow cold air and ozonized air inside the cleaning and sterilizing chamber (10).

The cold air blown to the raw egg (E) has a  
15 temperature of 0~1°C such that the cleaning water remaining on the surface of the raw egg (E) can be dried.

In the case where the drying air is heated, for example, the raw egg (E) may be made rotten or damaged while carrying out the first step. Therefore, cool, cold  
20 air is used in order to dry the cleaning water remaining on the surface of the raw egg (E).

In addition, ozonized air is blown into the cleaning and sterilizing chamber (10) during the process for drying the raw egg (E), thereby simultaneously carrying out a  
25 sterilization process. The ozonized air is commonly used for disinfecting various bacteria, and thus further detail thereon will not be described herein.

The quantity of ozonized air, which is blown into the cleaning and sterilizing chamber (10), is very small, on the order of 4 mg/ℓ per one hundred of raw eggs, so that it is harmless to the human body. The results of an  
5 experiment, where 4 mg/ℓ of ozonized air per 100 eggs is contacted with the raw eggs for 15 minutes, show that Escherichia coli is disinfected from 3,000 into less than 10. When contacted for 20 minutes, Escherichia coli is shown to have been disinfected into less than 2.

10 Therefore, the quantity of ozonized air required to be blown into the cleaning and sterilizing chamber (10) is calculated in proportion to the number of raw eggs (E) inside the chamber and blown into for 20 minutes. Then, Escherichia coli harmful to the human body is sterilized,  
15 along with Salmonella, Staphylococcus, enteritis vibrio, and the like.

The above cleaning and sterilizing step of raw eggs (E) is for the purpose of hygienic treatment for the whole process of the invention. Also, the cleaning and  
20 sterilizing step serves to prevent bacteria from penetrating the inside of the raw egg (E) during the subsequent third step of drilling the egg-shell.

The second step is a process for solidifying the albumen surface of a raw egg.

25 Referring to FIG. 3, in the albumen surface solidifying step, a plurality of raw eggs (E) is placed on a screen (21) inside the a humidifying and heating chamber

(20) and heated for 5-8 minutes by blowing air heated to 60-65°C using a heater (22). At this time, the raw egg (E) is prevented from drying by flowing moisture into the humidifying and heating chamber (20) using a humidifier  
5 (23), or by installing the humidifier (23) inside the humidifying and heating chamber (20).

While the second step is carried out, the egg shell (Ea) of the raw egg (E) starts to be heated and then the albumen (Eb) is progressively boiled inwards of the egg-shell (Ea), as shown in FIG. 4, which is a cross-section of  
10 a raw egg processed by the second step.

When the second step is finished, the raw egg (E) is processed such that the albumen (Eb) is boiled and cooked to a thickness of 2-3mm inwards of the egg-shell (Ea) to  
15 thereby form a solidified albumen skin layer (Ec) (the dotted area in FIG. 4). The albumen (Eb) and the yolk (Ed) inside the solidified albumen skin layer (Ec) remain in a semi-solid state.

By reference, in order for a raw egg to be well-done,  
20 it must be boiled at 80-85°C or higher for more than 12 minutes. In the second step of the invention, the raw egg is heated at 60-65°C for 5-8 minutes such that the surface area of the albumen (Eb) in the proximity of the egg-shell (Ea) is done to thereby form the solidified albumen skin  
25 layer (Ec).

When the albumen (Eb) of semi-liquid state and the yolk (Ed) are agitated, the solidified albumen skin layer

(Ec) is not agitated and remains in the solidified state. Therefore, when the raw egg is well done (fully boiled) and the egg-shell (Ea) (crust) is removed, the original color of the albumen (Eb) (white color) is exhibited.

5           The third step is an egg-shell drilling process, the fourth step is an edible composition injection process, and the fifth step is a raw egg agitating process, as illustrated in FIGS. 5 to 21. The second to fifth steps are continuously and automatically carried out.

10           Referring to FIGS. 5 and 6, the third and fourth steps, the egg-shell drilling process and the edible composition injection process are described hereafter.

          Referring to FIG. 5, the apparatus of the invention is provided with a raw-egg holding means (30) for fixing  
15 the raw egg (E).

          The raw egg holding means (30) is provided with a fixed member (32) having a resting groove (31), to which the raw egg can be inserted and rested. The resting groove (31) has a tough and buffering protection member (33)  
20 attached to the inner face thereof.

          In addition, a pressurizing cylinder (34) is mounted on one side face thereof. The pressurizing cylinder (34) is operated such that a pressurizer (35) presses one side face of the raw egg (E) so as not to be moved.

25           Therefore, the pressurizing cylinder (34) is operated in such a manner that the pressurizer (35) moves backwards in order for a raw egg (E) to be rested on the resting

groove (31), and thereafter moves forward and pressurizes the raw egg (E).

At this time, the protection member (33) serves as a buffer so that the raw egg is not broken, in spite of  
5 slight differences in the size of the eggs.

The raw egg is held in the raw egg holding means (30) in such a way that the elongated portion of the raw egg is oriented upwards.

The raw egg (E) held and fixed in the raw egg holding  
10 means (30) is drilled in its egg shell (Ea) and injected with an edible composition (P) by means of a drilling and injection means (40).

The drilling and injection means (40) is provided with a drilling and injection tube (42), which is descended  
15 and ascended vertically by the operation of a pressurizing cylinder (41) fixed to a main plate (50). The drilling and injection tube (42) is provided with a pointed needle (43) at the end thereof, and has a diameter of 2mm.

At one side of the pressurizing cylinder (41), a  
20 composition tank (44) is fixed to the main plate (50). In the outlet (45) of the composition tank (44) is installed a quantified discharging pump (46) for pressure-transferring the edible composition (P).

The quantified discharging pump (46) is constructed  
25 such that the edible composition (P) discharged therefrom is pressure-transferred into the drilling and injection tube (42) through a pressure-transferring hose (47) via an



intermediate station (48), which is installed above the drilling and injection tube (48) (refer to FIG. 6).

The operation of the egg-shell drilling and injection means (40) will be explained below. Details on the edible  
5 composition (P) will be described hereinafter.

At the initial state of the egg-shell drilling and injection means (40), the drilling and injection tube (42) is placed above the raw egg (E), as illustrated in FIG. 7.

At this state, the pressurizing cylinder (41) is  
10 operated to descend the drilling and injection tube (42) slowly to reach the egg-shell (Ea), as illustrated in FIG. 8.

Since the pressurizing cylinder (41) must be operated slowly, it is preferred to be a hydraulic cylinder, and it  
15 has been found that a pressure of  $3\text{-}5\text{kg/cm}^2$  should be exerted to the egg-shell (Ea) in order to form a hole therein.

In addition, the raw egg is erected in a longitudinal direction, and thus an injection hole (Ef) can be formed  
20 without breaking the egg, due to the resistant force of the egg-shell against the pressurizing force.

The area where the injection hole (Ef) is formed is slightly depressed, but can be disregarded, and thus does not affect significantly commercialization of the egg.

25 Therefore, the drilling and injection tube (42) is inserted into the central portion of the raw egg (E) and then the third step, i.e., the egg-shell drilling process

is completed, as shown in FIG. 9.

Next, the fourth step of edible composition injection process is carried out. In the edible composition injection process, at the state of FIG. 9, the quantified discharging  
5 pump (46) is operated to inject a quantified amount of edible composition (P) into the inside of the yolk (Ed) and the albumen (Eb) of semi-liquid state through the drilling and injection tube (42).

On the other hand, the edible composition (P) is  
10 formed of a liquid composition with a small amount of powder mixed therewith, and the amount of the edible composition (P) is less than 10 volume% of the entire volume of the raw egg.

When the injection of the edible composition (P) is  
15 finished, the pressurizing cylinder (41) is reverse-operated to lift the drilling and injection tube (42), which is released from the raw egg (E) and returned to the initial state as in FIG. 9. These operations are continuously and automatically performed by means of a  
20 controller (not shown).

Since the solidified albumen skin layer (Ec) has flexibility, it is contracted when the drilling and injection tube (42) is removed from the raw egg (E), so that it can be shut down from an external air and also the  
25 albumen of semi-liquid is not leaked to the outside thereof.

On the other hand, the edible composition (P) used in

the invention is formed of a liquid composition with a little powder mixed therewith. Here, the constituents of the edible composition are described below, and the effect therefor will be hereinafter explained.

5           That is, the edible composition (P) is comprised of edible and inter-mixable constituents selected from all natural and processed materials. The constituents do not cause any harmful chemical reactions with one another, and include brown rice, bean paste, garlic, onion, kelp,  
10           powdered pyogo mushroom, sesame oil, perilla oil, fine leaf extract, dropwort extract, propolis, grape seed oil, vinegar, basil, peppermint, chervil, lavender, salt, sugar, grains, fruits, nuts, fishes, shells, vitamin C, spices, pigment, and the like. Among the above constituents, the  
15           salt and sugar may be in a liquid or powder form. The salt or sugar is a basic constituent, which is added to all kinds of edible compositions (P) of the invention.

          Several examples for the constituents and contents of the edible composition (P) will be illustrated below. The  
20           contents thereof are based on the volume of the raw egg (E).

          Here, a chicken egg is used as the raw egg.

#### EXAMPLE 1

          An edible composition (P) comprises brown rice 2  
25           volume%, bean paste 1 volume%, garlic 1 volume%, onion 1 volume%, kelp 1 volume%, powdered pyogo bushroom 1 volume%, sesame oil 1 volume%, salt 1 volume%, and sugar 1 volume%.

EXAMPLE 2

An edible composition (P) comprises pine leaf extract 2 volume%, perilla oil 1 volume%, salt 1 volume%, and sugar 1 volume%.

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EXAMPLE 3

An edible composition (P) comprises dropwort extract 3 volume%, perilla oil 1 volume%, salt 1 volume%, and sugar 1 volume%.

EXAMPLE 4

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An edible composition (P) comprises propolis 1 volume%, grape seed oil 1 volume%, salt 1 volume%, and sugar 1 volume%.

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EXAMPLE 5An edible composition (P) comprises vinegar 2 volume%, grape seed oil 1 volume%, salt 1 volume%, and sugar 1 volume%.

EXAMPLE 6

An edible composition (P) comprises basil 2 volume%, grape seed oil 1 volume%, salt 1 volume%, and sugar 1 volume%.

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EXAMPLE 7

An edible composition (P) comprises peppermint 1 volume%, grape seed oil 2 volume%, salt 1 volume%, and sugar 1 volume%.

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EXAMPLE 8An edible composition (P) comprises chervil 2 volume%, grape seed oil 1 volume%, salt 1 volume%, and sugar 1 volume%.

EXAMPLE 9An edible composition (P) comprises lavender

2% volume, grape seed oil 1 volume%, salt 1 volume%, and sugar 1 volume%.

The fifth step is carried out in the raw egg (E), to which an edible composition (P) is injected. The fifth step  
5 is performed through an agitating means (60) and will be described below.

Referring to FIGS. 10 and 11, the main plate (50) is constructed so as to move along a guide rail (52) fixed on the support frame (51). The movement of the main plate (50)  
10 is carried out by a reciprocating cylinder (53) installed in one side thereof.

Therefore, after the raw egg (E) is processed through the egg-shell drilling and injection means (40), the reciprocating cylinder (53) is operated to move the main  
15 plate (50) in order for the agitating means (60) to be moved and held above the raw egg (E).

This moving and holding operation is carried out in such way that a controller (not shown) controls the operation of the reciprocating cylinder (53) when a dog  
20 (50a) provided in the main plate (50) approaches a first and second sensor (54) and (55).

That is, when the operation of the egg-shell drilling and injection means (40) is finished in the third and fourth steps, according to the instructions of the  
25 controller, the reciprocating cylinder (53) is operated to move the main plate (50) such that the dog (50a) approaches the second sensor (55).

Therefore, the second sensor (55) sends a signal to the controller, and the controller stops the movement of the reciprocating cylinder (53) according to the signal.

In addition, when the operation of the agitating means (60) is finished in the fifth step, the controller controls the reciprocating cylinder (53) such that the main plate (50) returns to its original position. At this time, when the dog (50a) approaches the first sensor (54), a signal is applied to the controller to stop the operation of the reciprocating cylinder (53).

The operation of the apparatus of the invention required for the manufacturing process of the invention is configured so as to be controlled by a controller. The control technique is well known, and thus details on the controller will not be described here.

Referring to FIGS. 12 to 18, the agitating means (60) for carrying out the fifth step of the invention will be explained below.

Referring to FIGS. 12 to 14, in the agitating means (60), an ascending and descending cylinder (61) is installed in the main plate (50), and a driving device (63) including a support member (62) descends or ascends by means of the ascending and descending cylinder (61).

In the driving device (63), a long support axle rod (64) is fixed to the center of the support member (62), and a free-rotating member (67) having a gear (65) and a rotating groove (66) is rotatably installed in the upper

portion thereof.

The gear (65) of the free-rotating member (67) is engaged with a driver gear (69), which is rotated by a reciprocal motor (68), as shown in FIG. 15. Therefore, the  
5 free-rotating member (67) is constructed so as to rotate in forward and reverse directions by rotating power transferred from the reciprocal motor (68).

In addition, an ascending and descending member (70) is inserted into the rotating groove (66) of the free-rotating member (67), as shown in FIG. 16. The ascending  
10 and descending member (70) is constructed such that it can move upwards and downwards by the operation of a moving cylinder (71) fixedly installed in the support member (62).

Therefore, as the ascending and descending member  
15 (70) moves upwards or downwards, the free-rotating member (67) moves upwards or downwards along the support axle rod (64).

In addition, the gear (65) is elongated vertically and thus the free-rotating member (67) can move upwards,  
20 and downwards at the engaged state with the driver gear (69). Also, when the downward movement of the free-rotating member (67) is completed and held in place, the free-rotating member (67) can be rotated in a forward or reverse direction by the driver gear (69), which is rotated by the  
25 rotation of the reciprocal motor (68).

On the other hand, a plurality of rotating members (72) (for example, four rotating members) is/are fixed to

the lower end portion of the free-rotating member (67) in such a manner that the rotating members (72) is/are rotated by the rotation of the free- rotating member (67) (refer to FIG. 17). The rotating members (72) may be fixed by using  
5 argon welding, spot welding, or the like.

Furthermore, a rotating member (72) has a thin thickness on the order of 0-6mm and is formed of piano wire or stainless steel having good resilience. As shown in FIG. 13, the rotating member (72) is provided with a bending  
10 groove (72a) formed in the inner side of the intermediate portion thereof so as to be easily bent.

The rotating member (72) is closely contacted with the outer circumferential surface of the support axle rod (64), and a ring (73) is inserted at the middle of thereof  
15 and fixed thereto by welding or the like.

Therefore, the ring (73) rotates as the rotating member (72) rotates on the circumferential surface of the support axle rod (64) (refer to FIG. 18.).

A free-rotating ring (74) is inserted into the lower  
20 end portion of the rotating member (72) and fixed thereto by welding or the like.

As shown in FIG. 14, a rotating projection (75) is formed in the inner circumferential surface. The rotating projection (75) is rotatably inserted into a guide groove  
25 (76) of the support axle rod (64). The entire diameter of all of the support axle rod (64), the rotating groove (71) and the free-rotating ring (74) is such that they can be



inserted through the injection hole (Ef) formed in the upper end portion of the raw egg (E).

Therefore, the free-rotating ring (74) is rotated by the rotation of the rotating member (72), but does not move upwards and downwards along with the support axle rod (64) since the rotating projection (75) is rotatably inserted into the guide groove (76).

Referring to FIG. 12, the operation of the agitating means (60) will be described below.

At the initial state of the agitating means (60), the driving device (63) is placed above as shown by an imaginary line.

In this state, the ascending and descending cylinder (61) is operated such that the driving device (63) is moved downwardly as shown by a solid line.

Next, the moving cylinder (71) is operated such that the free-rotating member (67) is moved downwardly as shown by an imaginary line. At this time, the rotating member 72 is descended since the upper end portion thereof is fixed to the free-rotating member (67).

However, since the rotating member (72) rotates only at its lower end portion and the free-rotating ring (74) connected so as not to move up-and down is fixed to the rotating member (72), the lower end portion of the rotating member (72) does not descend and only its upper end portion descends. Therefore, that portion of rotating member (72) between the ring (73) and the free-rotating ring (74) is

bent outwardly as depicted by an imaginary line.

At this state, when the reciprocal motor (68) is operated, its driving power rotates the free-rotating member (67) via the driver gear (69), and thus the rotating  
5 member (72) rotates about the support axle rod (64).

The returning operation to its original state is carried out in a reverse order of the above-described operation.

FIGS. 19 to 21 show the operation of the agitation means (60) to perform the fifth step of agitating a raw  
10 egg. FIG. 19 shows the initial state thereof, and FIG. 20 shows the state where the support axle rod (64) and the rotating member (72) are inserted into the injection hole (Ef) of the raw egg (E).

15 Therefore, at the above state, the rotating member (72) is spread sideways to form an impeller-like shape.

In this state, the reciprocal motor (68) is operated to rotate the rotating member (72) such that the semi-liquid albumen (Eb), the yolk (Ed), and the edible  
20 composition (P) are agitated and mixed. If a solidified albumen skin layer (Ec) is formed, it remains unmixed, not being agitated by the rotating member (72).

In the above-described embodiment, an agitating means, which is spread in an impeller form and rotated, is  
25 illustrated, but the present invention is not limited thereto. For example, an agitating means may be injected in a rod form and spread in various forms, and moves upwards

and downwards or rotates in order to agitate the contents inside the raw egg.

On the other hand, when the raw egg is agitated and well-done, the salt and sugar contained in the edible composition (P) play an important role. That is, the major constituent of the albumen (Eb) and the yolk (Ed) is an alkaline protein. Here, if the salt, which is an inorganic salt, is contained, it becomes an electrolyte, which adsorbs an ion having an opposite electric charge, so that electrical neutralization is achieved, thereby enabling easy solidification when carrying out well-done cooking. Also, in a state of a raw egg, when the conalbumin among the proteins of the albumen is bonded with a metallic ion such as Na of the salt NaCl, the internal bonding of the protein is cut, thereby increasing its activity.

That is, the salt serves to decrease the viscosity during agitating the mucus albumen (Eb) and the yolk (Ed), so that the edible composition (P) is mixed more thoroughly.

In addition, even with the same raw egg, the albumen (Eb) and the yolk (Ed) exhibit a different solidifying temperature and solidified state when well-done. That is, when the raw egg is heated up slowly from a low temperature, it becomes soft. Heating fast at a higher temperature is likely to generate porosity. Furthermore, the solidification capacity of a raw egg (E) is affected by other materials. When sugar is contained in the raw egg, it

absorbs sucrose contained in the protein of raw egg so that the solidification temperature of the raw egg (E) is increased. That is, the sugar slows down the heat transformation of protein and thus impedes its  
5 solidification, thereby resulting in a soft well-done egg.

As a result, the salt functions to lower the viscosity of the mucus albumen (Eb) and the yolk (Ed) so that they can be smoothly mixed with the edible composition (P). The sugar serves to enable the well-done egg to be  
10 soft and provide flavor.

As described previously, salt and sugar to be added to the edible composition (P) may be added in a liquid form or in a powder form. In addition, the above-described embodiment does not exclude other additives, which serve to  
15 perform the same as, or similar role to, the salt and the sugar.

On completion of the fifth step (agitating process), of the invention, as shown in FIG. 22, the sixth step (well-done process) is carried out to solidify the mucus contents (Eg), which is inter-mixed excepting the  
20 solidified albumen skin layer (Ec). This process may be performed by boiling the raw egg, smoking the raw egg, or steaming the raw egg to thereby make a well-done egg. These processes are well known, and thus details thereon will not  
25 be described here.

Alternatively, other than the heating and solidifying of raw egg, Fidan process (Fidan: a processed blackish duck

egg used for Chinese cooking), which is known from Taiwan or Southwestern China, or its applications can be used for chemically solidifying a raw egg using the solidifying property of alkaline. Pidan is made using a duck egg, but  
5 many examples using a chicken egg are known. Accordingly, the chemical solidification method can be applied to all kinds of raw eggs. In case of Pidan, a paste containing salt, lime or the like is coated on the egg-shell such that the alkaline constituent and salt can be permeated through  
10 micro pores of the egg-shell. It is based on the principle that, since protein is charged negatively usually under the circumstance of above PH 7, it is solidified when a material having an opposite electrical charge to the protein is applied thereto.

15       According to the invention, when the egg-shell (Ea) is peeled off from the well-done egg manufactured as described above, the solidified albumen skin layer (Ec) having a white color is exposed, and thus provides the same feeling as in eating a generally well-done egg, thereby  
20 enabling one to eat it without reluctance.

On the other hand, according to another embodiment of the invention, the second step may be omitted, and therefore, a solidified albumen skin layer is not formed, instead the albumen and the yolk are mixed and agitated. In  
25 this case, when the egg-shell is removed from a well-done egg, the color of the edible composition or a color of any edible pigment appears, and thus can attract one's

curiosity and interest.

Furthermore, according to another embodiment of the invention, the second step and the sixth step (solidification process) may be omitted, and thus a raw egg  
5 with an edible composition mixed and agitated therein can be provided.

On the other hand, the above-described manufacturing apparatus may be provided with an additional suction pump and/or suction tube for suctioning the yolk. Before the  
10 edible composition injection process, at least, of the raw egg contents including the albumen and the yolk is removed and instead the same amount of grain containing a carbohydrate such as rice, barley, glutinous rice, brown rice, or the like can be injected and agitated. Instead of  
15 providing an additional suction pump, the quantified discharging pump is reverse-operated to remove part of or the entirety of the raw egg contents. The grain may be injected together with an edible composition, or the grain alone may be injected.

20 Alternatively, part of the raw egg contents is removed, but part of or the entirety of the yolk remains. Then, fruit constituent can be injected and agitated in a powder form or in a liquid extract form, along with Calcium or an edible material containing Calcium (for example,  
25 dairy product such as milk, bean, green vegetable, seaweed, fish bone). In this case, a raw egg pudding can be made by means of the inter-mixing of the fruit constituent, Calcium

and the yolk.

As described above, each of the edible compositions is produced by adding at least one edible additive, each of which has certain nutrients and efficacy. The efficacy of the edible composition examples illustrated in the  
5 the edible composition examples illustrated in the embodiments of the invention will be described below.

The first example of the edible composition P, which comprises brown rice 2 volume%, bean paste 1 volume%, garlic 1 volume%, onion 1 volume%, kelp 1 volume%, powdered  
10 pyogo mushroom 1 volume%, sesame oil 1 volume%, salt 1 volume%, and sugar 1 volume%, can be mixed and agitated. Among the above constituents, the brown rice has efficacy, including facilitation of metabolism such as fatigue relief and fatness alleviation, enhancement of brain cell  
15 metabolism, blood pressure depressant, kidney activation, liver function enhancement, fatness prevention, energy metabolism acceleration. Also, it has an efficacy in menopausal disorder, feeling of helplessness caused by autonomies ataxia imbalance, headache, insomnia, feeling of  
20 fatigue, shoulder pain, dizziness, or the like.

In addition, it is well known that the bean paste has an efficacy of neutralizing toxins from meats, vegetables, mushrooms, insect, and the like, enhancing appetite, and facilitating digestion, and has an excellent anti-cancer  
25 effect. It also has an efficacy in headache alleviation, protection of high-blood pressure, and facilitation of liver function.

The garlic has an efficacy in lowering blood pressure, heart disease, sclerosis of the arteries, facilitation of digestion, constipation, diarrhea, prevention of flu, diabetes, nephritis, fatigue relief,  
5 enhancement of stamina.

The onion has an efficacy in reducing blood pressure, facilitation of digestion, stomach ulcer, and diabetes, and the kelp has an efficacy in constipation, skin aesthetics, diet, and an efficacy of impeding or controlling absorption  
10 of fat, cholesterol, excessive salt, heavy metals and harmful substances.

The pyogo mushroom is a low calorie constituent and abundant in various minerals and vitamins. It has an effect of preventing obesity, diabetes, heart disease, liver  
15 disease, or the like by adjusting the function of stomach and small intestine due to a constituent called hemi-cellulose. Also, it has an efficacy in anti-cancer, anti-virus, prevention of anemia and sclerosis of the arteries, and alleviating high blood pressure and cholesterol.

The sesame oil has an efficacy in lowering blood pressure, sclerosis of the arteries, constipation, enhancement of robustness and stamina, and the like. The  
20 perilla oil prevents sclerosis of the arteries, lowers the level of cholesterol, has an excellent effect of preventing carcinoma of large intestine, and has an efficacy of  
25 disinfecting the bite of poisonous insects.

The salt adjusts flavor and facilitates agitation,



and the sugar serves to smoothly solidify the protein of raw egg during its solidification.

In the case of the second example of edible composition, which comprises pine leaf extract 2 volume%,  
5 perilla oil 1 volume%, salt 1 volume%, and sugar 1 volume%, a well-done egg having a good aroma can be obtained. The pine leaf extract has an effect and efficacy in liver disease, intestine disease, nervous disease, skin protection, prevention of paralysis, strengthening of  
10 stomach, blood nourishment, prevention of aging-related disease such as sclerosis of the arteries, high blood pressure, and diabetes. Details on the perilla oil, salt, and sugar are described above and thus will not be repeated.

15 Therefore, the well-done egg agitated with the edible composition of the second example is suitable as a healthy food for people who like pine aroma.

The third example of edible composition comprises dropwort extract 3 volume%, perilla oil 1 volume%, salt 1  
20 volume%, and sugar 1 volume%. Its main constituent, the dropwort has a good effect and efficacy in stopping bleeding (hemostatic effect), high blood pressure, jaundice, influenza, alleviation of fever, tranquility, alcoholic poisoning, pneumonia, menstrual irregularity,  
25 sunstroke, robustness of stamina, acute and chronic inflammation of liver, cirrhosis of the liver, nourishment of blood, and constipation. It is suitable as a healthy

food for people who need this efficacy.

In case of the fourth example of edible composition, which comprises propolis 1 volume%, grape seed oil 1 volume%, salt 1 volume%, and sugar 1 volume%, the  
5 bioflavonoid contained in the propolis activates generation of interferon by stimulating leucocyte and limp sites, thereby providing an amazing resistance against diseases. The grape seed oil has a good efficacy in anti-oxidation, enhancement of skin smoothness and resilience,  
10 strengthening of capillary vessel, artery and vein, suppression of inflammation enzyme, enhancement of joint flexibility, and restoration of deteriorated memory, thereby providing a good healthy food for people who have a week resistance against diseases.

15 In the fifth example of edible composition, which comprises vinegar 2 volume%, grape seed oil 1 volume%, salt 1 volume%, and sugar 1 volume%, the vinegar suppresses synthesis of fat and decomposes fat to thereby prevent accumulation of fat, activate metabolism in the interior of  
20 the body, and provide a good efficacy in constipation. The grape seed oil has the efficacy as described above. Therefore, this example of edible composition is suitable for a city-dweller's healthy food.

The sixth example of edible composition (P) comprises  
25 basil 2 volume%, grape seed oil 1 volume%, salt 1 volume%, and sugar 1 volume%. The basil has an efficacy in rheumatism, hypersensitivity, headache, stomatitis, and

robustness. Therefore, along with the efficacy of the grape seed oil, it can be a good healthy food for elderly and weak people.

In the case of the edible composition of the seventh  
5 example, which comprises peppermint 1 volume%, grape seed  
oil 2 volume%, salt 1 volume%, and sugar 1 volume%, the  
peppermint has an efficacy in increasing blood pressure,  
strengthening of stomach, prevention of flu, headache,  
toothache, neuralgia, and alleviation of fever. Therefore,  
10 along with the efficacy of the grape seed oil, it provides  
a good healthy food.

The eighth example of edible composition comprises  
chervil 2 volume%, grape seed oil 1 volume%, salt 1  
volume%, and sugar 1 volume%. The chervil contains lots of  
15 vitamin C, carotin, magnesium and has an efficacy in  
lifeblood, urination, facilitation of digestion,  
rheumatism, improvement of skin. Therefore, it provides a  
diet healthy food for women.

The ninth example of edible composition comprises  
20 lavender 2 volume%, grape seed oil 1 volume%, salt 1  
volume%, and sugar 1 volume%. The lavender has a good  
effect for rheumatism, arthritis, and has an efficacy in  
bronchitis, allergic rhinitis, gastric ulcer, duodenal  
ulcer, and heart diseases. Along with the efficacy of the  
25 grape seed oil, it can provide a healthy food for elderly  
people.

In the above-described examples, the content of each

additive can vary under the condition that the edible composition is within 10% of the whole raw egg (in volume). For example, although the ninth example includes lavender 2 volume%, grape seed oil 1 volume%, salt 1 volume%, and  
5 sugar 1 volume%, it may comprise lavender 1 volume%, grape seed oil 1-5 volume%, salt 0-7 volume%, and sugar 0-5 volume%.

In addition, besides the additives as described above, meats, marine products, vegetables, various  
10 seasonings, spices, or the like can be included. Along with the natural materials, processed materials such as vitamin or the like can be added. The raw egg with the edible composition injected therein exhibits the inherent flavor and aroma, and color of the additives. The color, flavor,  
15 and aroma thereof can be freely adjusted and selected by edible pigments and spices.

On the other hand, the raw eggs processed according to the features of the invention can be provided to each individual user in various forms. For example, it may be  
20 provided in the form of raw egg with an edible composition agitated therewith, or a solidified form heated or chemically solidified after agitating. Also, after removing the egg-shell from a solidified egg, it may be contained in a packing container made of vinyl or plastic material  
25 before served.

The raw eggs processed according to the invention are rather necessary in the modern society. That is, what is

called "hidden starvation" is known in the modern world of the science of nutrition. This "hidden starvation" is resulted from inadequate intake of healthy nutrients such as vitamin, minerals, or protein. In many cases, people are not aware that he or she suffers from this starvation because they have quantitatively adequate meals. Occasionally, this starvation occurs to people who are confident that they are taking qualitatively good meals. Therefore, this kind of starvation is more dangerous and more likely to be harmful to health. Currently, the academic world reports that this starvation is of significance in this country.

The present invention becomes one approach to easily solve this hidden starvation. It is because the raw egg according to the invention has an edible composition including various nutrients and can be easily eaten. In particular, the egg of the invention exhibits the white of an egg even when the egg-shell is removed, so that it can be eaten without reluctance. Also, it may be processed such that without the white of an egg, it has various colors, flavors, and aromas, so as to meet various preferences of people, including elderly people, patients, adults, children, and men and women. Consequently, the raw egg of the invention can be served as an excellent favorite food, a nourishing meal, or a healthy food.

#### **Industrial Applicability**

As described above, according to the present invention, an edible composition is injected into the inside of a raw egg and agitated adequately, so that the edible composition is distributed over the whole area, but  
5 not localized in a certain area inside the white of the egg. Therefore, the commercialization value of the eggs can be increased. Also, the raw eggs can be served as a healthy food or nourishing meal.

While the present invention has been described with  
10 reference to the particular illustrative embodiments, it is not to be restricted by the embodiments but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present  
15 invention.